PolyGard® DT5-1112-2B11

Electrochemical Carbon Monoxide Transmitter with BACnet Interface
Serial No. AT03-003

User Manual

April 2012
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Electrochemical Carbon Monoxide Transmitter

1 General Overview

The PolyGard® CO BACnet gas transmitter DT5-1112-2B11 with digital processing of the measuring values and temperature compensation is used for the continuous monitoring of the ambient air to detect the presence of carbon monoxide gas. Applications include underground / enclosed parking garages, tunnels, engine test stations, shelters, loading areas etc.

The DT5-series transmitter is equipped with a serial interface including BACnet protocol and with an analog output where the signal can be selected as current signal (0)4-20 mA or as voltage signal (0)2-10 V. In the 4-20 mA mode the transmitter also works in the 2-wire technique. Addressing and calibration is done manually via push-buttons / potentiometers and address switches.

The intended installations are all areas being directly connected to the public low voltage supply, e.g. residential, commercial and industrial ranges as well as small enterprises (according to EN50 082).

The PolyGard® CO BACnet transmitter must **NOT** be used in potentially explosive atmospheres.

2 Functional Description

2.1 Control Mode

The transmitter can be connected via RS 485 Interface / BACnet protocol to a vide variety of monitoring and control devices such as, Direct Digital Controllers, Single/Multi-point controllers, Building Management Systems, Personal Computers etc. In this mode there is an analog input for the connection of an additional 4-20 mA transmitter. The two measuring values are transmitted via the RS-485 interface / BACnet protocol.

The cable topology for the RS-485 bus can be taken from the “Guidelines for wiring and commissioning of the DGC-05 hardware”.

2.2 Sensor

The sensor portion of the transmitter is a sealed electro-chemical cell with two electrodes, sensing and reference. The ambient air to be monitored diffuses through a membrane filter into the liquid electrolyte of the sensor. The chemical process of the measurement is one of oxidation where one molecule of the target gas is exchanged for one molecule of oxygen. The reaction drives the oxygen molecule to the counter electrode, generating a DC microampere signal between the sensing and reference electrodes. This signal is linear to the volume concentration of the sensed gas. The signal is evaluated by the connected amplifier and transformed into a linear output signal.

Electrochemical processes always lead by-and-by to a loss of sensitivity. Therefore calibration of zero-point and gain via BACnet or with the potentiometer “Gain” is necessary at regular intervals.

Caution:

There is a small quantity of corrosive liquid in the sensor element. If in case of damage persons or objects touch the liquid, you have to clean the affected areas as fast and carefully as possible with tap water. Out of use sensors must be disposed in the same way as batteries.

3 Installation

Note:
Avoid any force (e.g. by thumb) on the sensor element during operation or installation. Electronics can be destroyed by static electricity. Therefore, do not touch the equipment without a wrist strap connected to ground or without standing on a conductive floor (acc. to DIN EN100015).

3.1 Mounting Instructions

When choosing the mounting site please pay attention to the following:

- The specific weight of carbon monoxide is slightly less than that of air (factor 0.97).
  Recommended mounting height is 1.5 m (5 feet) to 1.8 m (6 feet) above floor.
- Choose mounting location of the sensor according to the local regulations.
- Consider the ventilation conditions! Do not mount the transmitter in the center of the airflow (air passages, suction holes).
- Mount the transmitter at a location with minimum vibration and minimum variation in temperature (avoid direct sunlight).
- Avoid locations where water, oil etc. may influence proper operation and where mechanical damage might be possible.
- Provide adequate space around the sensor for maintenance and calibration work.
- In areas where condensation may occur inside the electrical conduit, a sealing agent should be used if the conduit entry is at the top of the transmitter.

Duct mounting

- Mount only in a straight section of duct with minimum air vortex. Keep a minimum distance of 1 m (3,5 feet) from any curve or obstacle.
- Mount only in a duct system with a maximum air velocity of 10 m/s (2000 ft/min) or less.
- Mounting must be performed so that the probe openings are in line with the airflow.

3.2 Installation

- Open the cover, Unplug basic PCB carefully from the wiring terminals.
- Mount enclosure vertically to the wall.
- Plug in the basic PCB at X4 and X5 with care, Replace the cover.

4 Electrical Connection

Consider static electricity! See 3. Mounting

- Installation of the electrical wiring should only be performed by a trained specialist according to the connection diagram, without any power applied to conductors and according to the corresponding regulations!
- Avoid any influence of external interference by using shielded cables for the signal line, but do not connect the shield.
- It is important to ensure that the wire shields or any bare wires do not short the mounted PCB.
- Recommended cable for power and BACnet communications is 18 gage, two twisted shielded pair with all four wires being different colors (Connect-Air Wire & Cable W182P-247 or equivalent).

  When selecting and installing the cables you have to comply with the regulations concerning the RS 485 bus installation. The installations have to be executed in line topology. Cable length and type have to be considered as well.

4.1 Wiring Connection

- Open the cover, Unplug basic PCB carefully from terminal blocks at X4 and X5.
- Insert the cable and connect cable leads to terminal blocks. See fig. 1.and 2.
- Replug the PCB in the terminal blocks X4, X5, Replace cover.

5 Commissioning

Consider commissioning instructions at any exchange of sensor elements.

Only trained technicians should perform the following:

- Check mounting location.
- Select output signal form Current or voltage, and starting point 0 or 20%. See fig. 4
- Check power voltage.
- Check PCB for proper mounting at X4 and X5.
- Change BACnet ID 1(delivery ID) to unique ID (defined from System Integrator)
- Transmitter is factory calibrated and should not require adjustment at startup.

Required instruments for commissioning (calibration) of the transmitter:

- Test gas bottle with synthetic air of CO-free ambient air.
- Test gas bottle with CO (ppm) in the range of 30 – 80 % of the measuring range.
- Gas pressure regulator with flow meter to control the gas flow to 150 ml/min.
- Calibration adapter with tube (INTEC model number CONKIT-E/CH-LC)
- Digital voltmeter with range 0 – 300mV, accuracy 1% (for manual calibration).
- Small screwdriver (for manual calibration).

Note:

Prior to calibration or verification, the sensor element must be fully stabilized by applying power voltage for at least 1 hour without interruption.

Please observe proper handling procedures for test gas bottles (regulations TRGS 220)!

Attention: CO calibration gas is toxic, never inhale the gas!
Symptoms: Dizziness, headache and nausea.
Procedure if exposed: Take the victim into fresh air at once, call a doctor.

5.1 Calibration

Only manual calibration mode in combination with BACnet protocol is possible to calibrate the transmitter:

Manual calibration

Manual calibration is only possible if the transmitter is equipped with the push-button “Zero” and the potentiometer “Gain” (= version for manual calibration).

The jumper V-A has to be set before manual calibration. Only by doing so the control voltage is available at the test pins X6. Remove the jumper after calibration.

5.2 Manual Zero-Point Calibration

Consider the warm-up period of the sensor (at least 1 hour).

- Connect calibration adapter carefully to the sensor element.
- Apply synthetic air (150 ml/min; 1 Bar (14.5 psi) ± 10%), or CO-free ambient air.
- Wait 2 minutes until the signal is stable, push button “Zero” for 5 seconds.

  After successful calibration the measuring signal is corrected automatically. Depending on the selected signal starting point the measuring signal shows the following values:

  Signal start at 2 V or 4 mA 40 mV = 0 ppm
  Signal start at 0 V or 0 mA 0 mV = 0 ppm

  If the zero-point is out of the admissible range (> 20 mV at starting point 0% / > 60 mV at starting point (20%) before calibration, there is no correction of the measuring signal. The sensor has to be replaced.
- Remove calibration adapter carefully by turning lightly. Check the sensor for correct mounting!

5.3 Manual Gain Calibration

- Connect calibration adapter carefully to the sensor element.
- Apply calibration test gas CO (150 ml/min; 1 Bar (14.5 psi) ± 10%).
- Wait two minutes until the signal is stable, adjust control voltage with potentiometer ”Gain” until the signal corresponds to the calculated value ± 3 mV, see Calculation of Control Voltage.

  By limiting the gain factor, calibration will not be possible any more when the sensitivity of the sensor reaches a residual sensitivity of 30 %. Then the sensor has to be replaces.
- Remove calibration adapter with a careful light turn. Check the sensor for correct mounting!

Calculation of Control Voltage

Signal start 2 V / 4 mA

$$\text{Control voltage (mV)} = \frac{160\ (\text{mV}) \times \text{test gas concentration CO (ppm)}}{\text{measuring range CO (ppm)}} + 40\ (\text{mV})$$

Signal start 0 V / 0 mA

$$\text{Control voltage (mV)} = \frac{200\ (\text{mV}) \times \text{test gas concentration CO (ppm)}}{\text{measuring range CO (ppm)}}$$

Example:

Measuring range	300 ppm
Test gas concentration	242 ppm CO
Control voltage: Signal start 2 V / 4 mA	169 mV
Control voltage: Signal start 0 V / 0 mA	161,3 mV

Signal start 2 V / 4 mA

$$\frac{160\ (\text{mV}) \times 242\ (\text{ppm})}{300\ (\text{ppm})} + 40\ (\text{mV}) = 169\ \text{mV}$$

Signal start 0 V / 0 mA

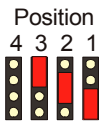
$$\frac{200\ (\text{mV}) \times 242\ (\text{ppm})}{300\ (\text{ppm})} = 161{,}3\ \text{mV}$$

6 Addressing

Depending on the hardware version MS/TP addressing of the transmitter is done via an address switch.

6.1 Manual Addressing MS/TP

Manual addressing is accomplished via the 16-position rotary address switch and a jumper for selecting the 4 address ranges. Transmitters ordered with the “high address range” option (order code “H”) can be addressed in the range of 61-120. Firmware in the transmitter adds 60 to the value selected in the table below.

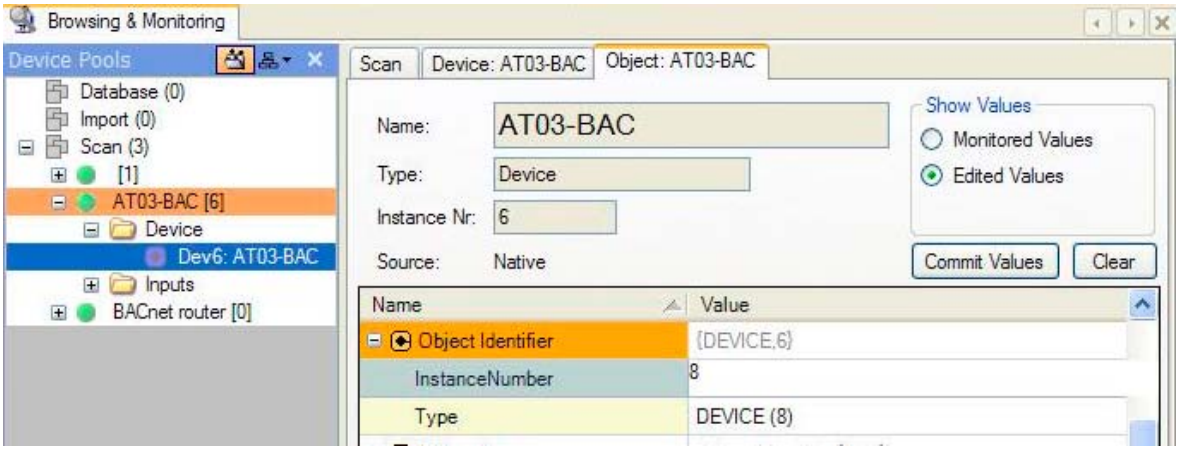


Switch position	Jumper pos. 01 = address	Jumper pos. 02 = address	Jumper pos. 03 = address	Jumper pos. 04 = address
0	inactive	inactive	inactive	inactive
1	01	16	31	46
2	02	17	32	47
3	03	18	33	48
4	04	19	34	49
5	05	20	35	50
6	06	21	36	51
7	07	22	37	52
8	08	23	38	53
9	09	24	39	54
A	10	25	40	55
B	11	26	41	56
C	12	27	42	57
D	13	28	43	58
E	14	29	44	59
F	15	30	45	60

6.2 BACnet Addressing

In addition to selecting the MS/TP address, the BACnet address must also be selected.
According to BACnet Rules, the BACnet address must be unique within the entire system.
Typically this will be assigned by the BACnet System Integrator.

Version 0.1 :
In Device Object- Object Identifier- Instance Number is settable to unique Number from 1 to 4194299
This can be done with all BACnet Software Tools , which allow changing Data
of Device Object- Object Identifier



After changing this parameter, the transmitter must be powered off and on again!

7 Inspection and Service

7.1 Inspections

Inspection, service and calibration of the transmitters should be done by trained technicians and executed at regular intervals. We therefore recommend concluding a service contract with INTEC Controls or one of their authorized partners.

7.2 Calibration

(See section 5.1 ;5.2 and 5.3)

- Calibration should be performed at periodic intervals as determined by the person responsible for the gas detection system (recommendation every 12 months).
- After exchange of the sensor
- If in case of operational or climatic influences the sensitivity of the sensor falls below 70 % in operation, calibration will not be possible any more. Then the sensor has to be changed.

7.3 Exchange of Sensor Element

Consider static electricity! See point 3.

Sensor should always be installed without power applied:

- Unplug basic PCB carefully from the wiring terminals.
- Unplug old sensor element from the PCB.
- Take the new sensor out of the original packing.
- Plug in the sensor element into the PCB at X3/X7.
- Replug the PCB into terminal blocks X4, X5 carefully.
- Transmitter must be recalibrated according to section 5.

8 Troubleshooting

8.1 Analog Mode

Trouble	Cause	Solution
Output signal < 3 mA / 1,5 V and/or control voltage < 30 mV only for starting signal 2V/4 mA	Jumper 0-20 % not set	Check jumper position
	Power voltage not applied	Measure tension at X4: Two-wire: Pin 1 (+) and 4 (-) Three-wire: Pin 1 (+) and 2 (-)
	PCB AT03 not plugged in correctly at X4 and X5	Replug PCB correctly
	Wire break	Check the wiring
Output signal > 22 mA /220 mV	Short-circuit	Check the wiring
Control voltage does not reach the calculated value	Sensor element not calibrated	Calibrate sensor element
	Sensor sensitivity < 30 %	Replace sensor element
No reaction of the output signal in spite of gas concentration	Power voltage not applied	Measure tension at X4
	Signal (Pin 4) not wired correctly	Check the wiring

8.2 BACnet Mode

Trouble	Cause	Solution
Yellow LED not shining	Power voltage not applied	Measure tension at X4: Pin 1 (+) and 2 (-)
	PCB not plugged in correctly at X4/X5	Replug PCB correctly
	Wire break	Check wiring
Yellow LED not flashing	No communication at the transmitter	Transmitter not addressed, check bus wiring incl. topology and termination Voltage < 16 V
No control voltage at calibration	Jumper V-A not set	Set the jumper. Remove it after calibration!

9 Cross-sensitivity Data

The cross sensitivity (influence on the gas concentration value by gasses other than carbon monoxide) can be read from the table Technical Data (see 9.). Other gases can have an influence on the sensitivity, too. The table does not claim to be complete. The indicated sensitivity data are only standard values referring to new sensor elements.

10 BACnet Specification

BACnet Standardized Device Profile

BACnet Networks allow Peer to Peer Communication.

DGC05-Bacnet-Interface supports functions that fit the BACnet profile called an

"**Application Specific Controller**" (B-ASC).

10.1 BACnet Services

DGC05-Bacnet-Interface supports the following BACnet protocol services:

1. Who-Is (Execute) Upon receipt of a Who-Is request, EasyBAC initiates an I-Am request, as appropriate, using Device object's properties values for service request parameters.

2. I-Am (Initiate) DGC05-Bacnet-Interface initiates I-Am requests filled with Device object's properties values in the following situations:
· at start-up
· upon receipt of a Who-Is request

ReadProperty (Execute) all properties present in the Object Database are readable.
Upon receipt of a Read Property request, **DGC05-Bacnet-Interface** performs request validation and sends back an acknowledgement, as defined by the BACnet standard. In case of a success.

DGC05-Bacnet-Interface sends back to the BACnet network positive acknowledgement (ReadProperty-ACK) containing current value of the requested property from the BACnet Object Database. In case of a failure, **DGC05-Bacnet-Interface** sends negative acknowledgement (BACnet-Error) with appropriate BACnet error class and error code.

Current value of a property in the Database may originate from:

- DGC05-Bacnet-side
- DGC05-Controller
- Another BACnet device (set by means of a WriteProperty BACnet service request)

WriteProperty (Execute) Most of the properties in the BACnet Object Database are not writeable and cannot be changed by means of a WriteProperty service request. See Object Types Supported for complete list of writeable properties in each supported object type.

Upon receipt of a valid WriteProperty request, **DT% BACnet transmitter** writes to the Virtual Object Database specified value of the specified property of the specified object and sends back to the BACnet network positive acknowledgement, as defined by the BACnet standard. In case of a failure

DGC05-Bacnet-Interface sends negative acknowledgement.

If the property being written is Present value or Relinquish default, and the object in question is not out of service (see Handling out Of Service Property), new property value is sent to the **DT5 BACnet-Transmitter**. FB: Output Property serial message is sent a synchronously and may be sent to the microprocessor either after or before BACnet acknowledgement is actually sent over the BACnet network.

DT5-Bacnet-Transmitter WriteProperty handler performs basic request validity checks, such as existence of the object specified, existence and write ability of the property specified. Standard-mandated BACnet logic is also implemented: see handling Command Priorities and Out_Of_Service handling.

However, application-level checks, such as checking Present_Value against device-specific bounds, are not performed.

10.2 BACnet BIBBs supported

The BACnet standard defines a concept called **BIBBs** (BacNET Interoperability Building Blocks). A BIBB is a simple definition of a specific set of BacNET features that must be implemented by a device to support that BIBB.

The **DT5-Bacnet-Transmitter** is capable of performing the functionality of the following BIBBs:

· **DS-RP-B** that means **DS** (data sharing), **RP** (read property), **B** (Server device)

· **DS-WP-B** that means **DS** (data sharing), **WP** (write property), **B** (Server device)

· **DM-DDB-B** that means **DM** (device management), **DDB** (Dynamic Device Binding), **B** (Server device) The "DDB" description means that this device can find another device on the network.

This set of BIBBs matches the **BACnet B-ASC profile** (without support for Who-Has/I-Have and DCC - Device Communications Control)

10.3 Reliability property handling

DGC05-Bacnet-Interface checks all possible DGC05 –Bus-Nodes for his correct functionality. If a Sensor- or Relay Module is not available, damaged or not activated: Input property with property ID set to Reliability **DGC05-Bacnet-Interface** automatically updates FAULT flag in the Status Flags property in the BACnet Object Database: sets it if new Reliability value is not equal to NO_FAULT_DETECTED, and clears it otherwise.

10.4 MS/TP Master Specification

Interface Settings

Baud:	38400 (others on request)
Start bit	1
Stop bit	1
Parity	No
MS/TP MAC Address	See 6.2

Fixed internal program definitions without properties

Max Master	127
Max Info Frames	1

10.5 Device Register description: available Properties

Name	Default Value	R / W	Notes
APDU Timeout	3000	R	Timeout in ms
App Software Version	DTF-BNK V0.1	R	BACnet Stack Version
Database Revision	1	R	
Description		R / W	Changeable by BacNet Integrator
Firmware Revision	DTF-BNK V0.1	R	
Max APDU Length Accepted	480	R	
Model Name	AT03-XXXXX	R	
Number of APDU Retries	3	R	
Object Identifier	DEVICE, 1	R / W	Changeable by BacNet Integrator
Object List: DEVICE ANALOG_INPUT0 ANALOG_INPUT1	 1 0 1	R	
Object Name		R / W	Changeable by BacNet Integrator
Object Type	DEVICE(8)	R	
Protocol Conformance Class	1	R	
Protocol Objects Supported	ANALOG_INPUT, DEVICE	R	
Protocol Services Supported	READ_PROPERTY, READ_PROPERTY_MULTIPLE, I_AM, WHO_IS	R	
Protocol Version	1	R	
Protocol Revision	1	R	
Segmentation Supported	NO_SEGMENTATION(3)	R	
System Status	OPERATIONAL(0)	R	
Vendor Identifier	532	R	
Vendor Name	MSR Electronic GmbH	R	

Not Available Properties
The following optional properties are not present: Location**,** Max_Segments_Accepted, VT_Classes_Supported, Active_VT_Sessions, Local_Time, Local_Date, UTC_Offset, Daylight_Savings_Status, APDU_Segment_Timeout, List_Of_Session_Keys, Time_Synchronization_Recipients, Max_Master, Max_Info_Frames, Configuration_Files, Last_Restore_Time, Backup_Failure_Timeout, Active_COV_Subscriptions, Slave_Proxy_Enable, Manual_Slave_Address_Binding, Auto_Slave_Discovery, Slave_ Address_Binding, Profile_Name.

10.6 Analog Input1 Register description (internal CO Sensor)

Name	Default Value	R / W	Notes
Description	Descr_AI0	R / W	Changeable by BacNet Integrator
Event State	STATE_NORMAL(0)	R	
Object Identifier	0	R	
Object Name	Carbon Monoxide	R / W	Changeable by BacNet Integrator
Object Type	ANALOG_INPUT(0)	R	
Present Value		R	Current Gas Value
Units	PARTS_PER_MILION(96)	R	

10.7 Analog Input2 Register description (external CO Sensor)

Name	Default Value	R / W	Notes
Description	Descr_AI1	R / W	Changeable by BacNet Integrator
Event State	STATE_NORMAL(0)	R	
Object Identifier	1	R	
Object Name	External Transmitter	R / W	Changeable by BacNet Integrator
Object Type	ANALOG_INPUIT(0)	R	
Present Value		R	Current Gas Value
Units	PARTS_PER_MILION(96)	R	

Not Available Properties:

The following optional properties are not present: Update_Interval, COV_Increment, Time_Delay, Notification_Class, High_Limit, Low_Limit, Deadband, Limit_Enable, Event_Enable, Acked_Transitions, Notify_Type, Event_Time_Stamps, Profile_Name.

Dynamic Properties:
This Analogue Input Object reflects the Current Value Information from Digital Gas Sensors .
During Normal Operation Properties
- **Present value** and
- **Status Flags** will be updated by ADT Transmitter

11 Technical Data

General sensor performances		
Gas type	Carbon monoxide (CO)	
Sensor element	Electrochemical, diffusion	
Measuring range (standard, other ranges according to the data sheet)	0 - 300 ppm (ex works) adjustable between 0-150 and 0-300 ppm	
Pressure range	Atmosphere ± 15 %	
Humidity	15 – 90 % RH non condensing	
Storage temperature range	5 °C to 30 °C (41 °F to 86 °F)	
Storage time	Max. 6 months	
Mounting height	1,5 to 1,8 m (5 to 6 ft.)	
Type DT5-1112		
Accuracy	± 3 ppm	
Repeatability	± 3 % of reading	
Long-term output drift	< 5% signal loss/year	
Response time	t_{90} < 50 sec.	
Life expectancy	> 5 years/normal operating environment	
Humidity range – short-term	0 – 95 % RH non condensing	
Temperature range - continuous	-10 °C to + 50 °C (14 °F to 122 °F)	
Temperature range – short-term	-20 °C to + 50 °C (-4 °F to 122 °F)	
Cross sensitivity*	Concentration (ppm)	Reaction (ppm CO)
Acetone, C_3H_6O	1000	0
Acetylene, C_2H_2	40	80
Ammonia, NH_3	100	0
Chlorine, Cl_2	2	0
Ethanol, C_2H_5OH	2000	5
Iso Propanol, C_3H_8O	200	0
Carbon dioxide, CO_2	5000	0
Nitrogen dioxide, NO_2	50	-1,0
Nitric oxide, NO	50	8
Sulphur dioxide, SO_2	50	< 0,5
Hydrogen Sulphide, H_2S	25	0
Hydrogen, H_2	100	20

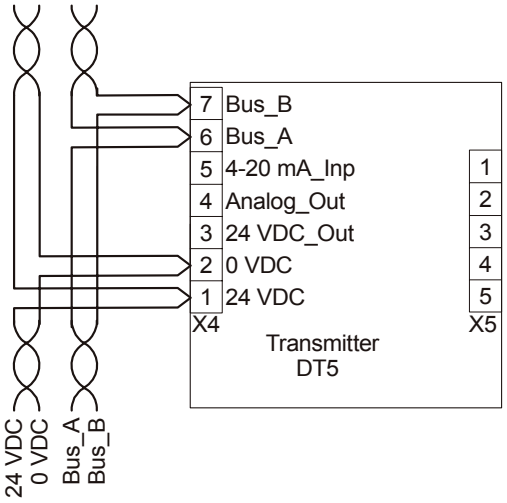
* The table doesn't claim to be complete. Other gases, too, can have an influence on the sensitivity. The mentioned cross sensitivity data are only reference values valid for new sensors.

Electrical	
Power supply	18 - 28 VDC, reverse polarity protected
Power consumption Mode (without options) - Analog mode - Bus mode	 22 mA, max. (0,6 VA) 12 mA, max. (0,3 VA)
Output signal	
Analog output signal Selectable: Current / voltage Starting point 0 / 20 %	(0) 4 – 20 mA, load ≤ 500 Ω, (0) 2 - 10 V; load ≥ 50 k Ω proportional, overload and short-circuit proof
Serial interface	
Transceiver	RS 485 / 38400 Baud
Protocol	BACnet
Physical	
Enclosure*	Polycarbonate, UL 94-HB fire retardant
Enclosure color*	Light gray
Dimensions* (H x W x D)	5.12 x 3.70 x 2.25 in. (130 x 94 x 57 mm)
Weight*	Approx. (0.6 lbs.) (0.25 kg)
Protection class*	IP 65
Mounting*	Wall mounting, pillar mounting
Cable entry	½" conduit
Wire connection	Screw-type terminal min. 0,25, to. 2,5 mm^2 24 to 14 AWG
Approval	
	VDI 2053 German air treatment systems for car parks UL2075 ; UL61010-1
Guidelines	EMC Directive 2004 / 108 / EWG
	CE

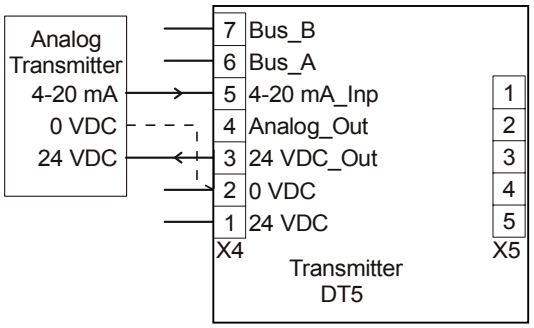
Options	
Analog input	
Only for RS-485 mode	4 – 20 mA overload and short-circuit proof, input resistance 200 Ω
Power supply for external transmitter	24 VDC max. 50 mA

Figures

Fig. 1
Application: BACnet mode

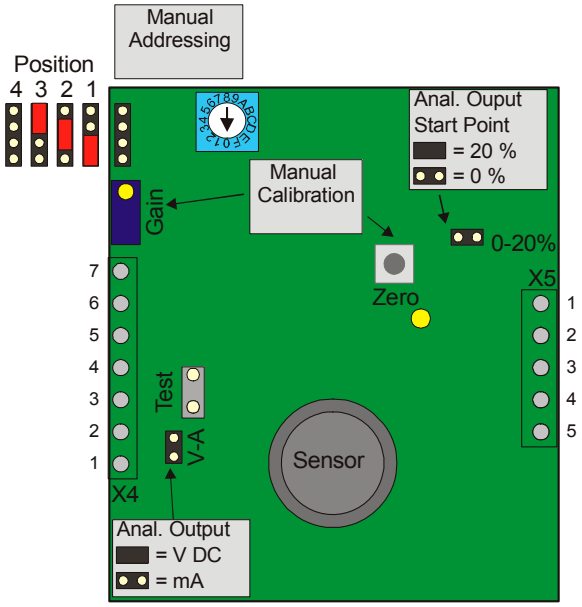


Connection field bus

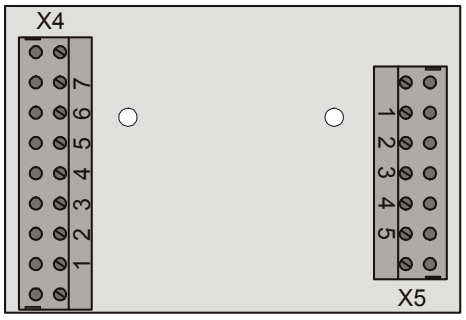


Connection analog transmitter
- Two- or three-wire connection, depending on transmitter type

PCB AT03
Fig. 2



Terminal block



Selection analog output signal
Fig. 3

Jumper 0- 20 %	Jumper V-A	Output signal
Not set	Not set	0 – 20 mA
Set	Not set	4 – 20 mA
Not set	Set	0 – 10 V
Set	Set	2 – 10 V

Calibration adapter
Fig. 5
Type: CONKIT-E/CH-LC

relevant. 12700 Stowe Drive, Suite 100, Poway, CA 92064 | Ph: (858) 578.7887 & (888) GO.IN*TEC* | relevantsolutions.com/inteccontrols

12 Notes and General Information

It is important to read this user manual thoroughly and clearly in order to understand the information and instructions. The PolyGard® transmitters must be used within product specification capabilities. The appropriate operating and maintenance instructions and recommendations must be followed.

Due to on-going product development, MSR and IN*TEC* Controls reserve the right to change specifications without notice. The information contained herein is based upon data considered to be accurate. However, no guarantee is expressed or implied regarding the accuracy of this data.

12.1 Intended Product Application

The PolyGard® transmitters are designed and manufactured for control applications and air quality compliance in commercial buildings and manufacturing plants (i.e. detection and automatic exhaust fan control for automotive maintenance facilities, enclosed parking garages, engine repair shops, warehouses with forklifts, fire stations, tunnels, etc.).

12.2 Installers' Responsibilities

It is the installer's responsibility to ensure that all PolyGard® transmitters are installed in compliance with all national and local codes and OSHA requirements. Installation should be implemented only by technicians familiar with proper installation techniques and with codes, standards and proper safety procedures for control installations and the latest edition of the National Electrical Code (ANSI/NFPA70). It is also essential to follow strictly all instructions as provided in the user manual.

12.3 Maintenance

It is recommended to check the PolyGard® transmitter regularly. Due to regular maintenance any performance deviations may easily be corrected. Re-calibration and part replacement in the field may be implemented by a qualified technician and with the appropriate tools. Alternatively, the easily removable plug-in transmitter card with the sensor may be returned for service to MSR-Electronic-GmbH.

12.4 Limited Warranty

MSR-Electronic-GmbH and IN*TEC* Controls warrants the PolyGard® transmitter for a period of two years, 12 months normal exposure for the sensor, from the date of shipment against defects in material or workmanship. Should any evidence of defects in material or workmanship occur during the warranty period, IN*TEC* Controls will repair or replace the product at their own discretion, without charge.

This warranty does not apply to units that have been altered, had attempted repair, or been subject to abuse, accidental or otherwise. The warranty also does not apply to units in which the sensor element has been overexposed or gas poisoned. The above warranty is in lieu of all other express warranties, obligations or liabilities.

This warranty applies only to the PolyGard® transmitter. MSR-Electronic-GmbH and/or IN*TEC* Controls shall not be liable for any incidental or consequential damages arising out of or related to the use of the PolyGard® transmitter.

If the PolyGard® transmitter needs to be returned to IN*TEC* Controls for service, an RMA number must be obtained prior to sending.

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